

## DESCRIPTION

**Invention title.-**

A SYSTEM FOR PROJECTING IMAGES ON INSCRIBED POLYHEDRONS HAVING POLARIZABLE FACES AND A PROJECTION PROCEDURE

**5 Background to the previous technical situation.-**

It is unknown so far as background is concerned about the previous technical situation of a device with an image projector situated within the smaller polyhedron of two or more inscribed hollow polyhedrons, each one being contained within another larger one but not being encapsulated with contacting faces, since it is essential that there is enough distance between their faces so that an external spectator could appreciate the three-dimensional or space effect that is proposed.

The smaller polyhedron is contained within a bigger one that circumscribes it and this one successively within the next, all of them could be either concentric, in which case they would have the same centre, or could be on the same base or each one could have a different base at different levels.

The polyhedrons consist essentially of faces of translucent glass polarizable to transparent, making it possible to project images in a successive way on every polyhedron, only the inner one or any of the outer ones when the glass polarization is activated, since on becoming transparent it modifies the glass screen where the image is projected by retro projection with a three-dimensional effect and with a demonstrative, advertising or exhibition purpose.

**Disclosure of the invention.-**

The proposed invention is a retro projection procedure and an appropriate device for its working, based on the retro projection of images on concentric or successive screens, which are activated successively in order to fix the projected image onto every screen.

The screens consist of two sheets of glass or another transparent material with a liquid between both sheets which is liable to conversion to transparent or translucent states by electrical polarization or depolarisation, so that the image stops being reflected on the screen when it is transparent and on the contrary the image is reflected on the one that is in translucent state.

This produces the effect of moving the space plane where the image is formed, approaching or moving away from the spectator and increasing or decreasing its size.

As a result the procedure is a system of retro projection images associated to the next technical characteristics:

10 1º.-The source of images will be placed inside the inner polyhedron of two or more hollow ones preferably regular with the same shape although irregular or different shaped polyhedrons could be used if they are provided with lenses, mirrors or auxiliary projectors for redirection of images situated on the faces of each polyhedron that is not used as a screen so that the auxiliary means are made invisible to the spectator.

15 2º.- The polyhedrons will be disposed in a way that each one is interior or inscribed in respect of the next one that circumscribes it, with separation between faces so that all polyhedron faces used as screens are parallel and totally or partially inscribed inside the luminic angle of image projection.

In certain cases though, the inscribed polyhedrons could be conjugated or have their 20 faces in angle with respect to those of the circumscribed polyhedron.

In which case, they will have to be associated to a complex system of lenses, mirrors or other optical means which redirect the images by reflection to the next polyhedron or have auxiliary independent projectors.

The essential content of the new invention is the visual effect that is caused to the 25 spectator by a multiscreen device in which each screen inscribed inside another bigger

one or circumscribed to another smaller one could become transparent or translucent by modifying the special location of the same image in a three-dimensional system.

As far as the present description is concerned, an inscribed polyhedron is defined as the one which is contained within another bigger one that circumscribes it, similarly to what 5 is said about a polygon inscribed inside a circumscribed polygon.

3º.- The polyhedron faces will be made of a special crystal, in glass, methacrylate or any other substance, characterised by being translucent under ordinary conditions, operating in this case to an external observer as a screen to retro project the images projected onto it emitted from the inner part of the polyhedrons.

10 Alternatively it becomes transparent by polarization or another method when a light electrical current is passed through it.

In such a case the images that appear from the image projector device will pass through the transparent glass freely and they will be projected onto the next polyhedron faces that are translucent, directly or by reflection of the image by means of lenses or 15 auxiliary mirrors.

They could also be emitted onto the circumscribed polyhedron by means of independent auxiliary projectors.

It is essential that images are seen by an outside observer by retro projection onto one or another screen which is contained within another larger one and that the screen where 20 the images are projected could be modified at the choice of an operator or the spectator himself.

4º.- With a device of dynamic effect which modifies the polyhedron's translucent or transparent state by activating or deactivating the glass polarization respectively.

With a system like a computer or another system that regulates the electrical current of 25 polarization of each polyhedron screen, it will be possible to project images from the

inside of them, successively onto any of the faces of every polyhedron, depending on whether they are polarized or not.

Thus each polyhedron could act in an independent way in a three-dimensional multiscreen system.

5 5º.- An auxiliary system of lenses, mirrors or independent auxiliary projectors will have to make sure that the same image emitted by a projector or from an internal bunch of projectors is appropriately directed for its projection or it is projected from an auxiliary projector on all polyhedron faces.

6º.- The internal image projector in every case will remain concealed to the spectator  
10 because there will always be between the spectator and the projector an activated screen with images projected on it which will prevent the projector from being seen.

This one could be concealed as the case may require in order to make it disappear from the inner polyhedron in which it is contained to make it invisible, supposing that the operator polarizes the faces of all the polyhedrons making them totally transparent.

15 7º.- The lenses or auxiliary mirrors of image redirection and as the case may be the independent auxiliary projector, will be installed in one of the polyhedrons faces that is not used as a screen, so they stay concealed to the spectator's sight on those polyhedron faces that operate as screens.

The new invented device is a projector located in the inner polyhedron of two or more  
20 polyhedral bodies, each one being inscribed in a bigger one that contains it, concentric or not, preferably consisting of parallel faces which are separated from each other and inscribed into the emitter angle of light projection.

The polyhedron faces are made of translucent polarizable crystal, either glass, methacrylate or any other material, and provided with a system of lenses or

multidirectional mirrors in order to allow the projection of the same image onto all the faces of every glass polyhedron from the inside.

Glass polarization or depolarisation allow the image to be seen in any of the glass polyhedrons by modifying its three-dimensional location in space simultaneously in all  
5 the polyhedron faces or in those selected as screens.

The image projector is not accessible to the eye of the spectator since it is located inside and because an activated screen always exists between the spectator and the projector, or as the case may require by concealing the projector in order to make it disappear if all screens are polarized and made transparent.

10 In this way, a new device of projection with luminic, three-dimensional and dynamic effects, able to hold spectator attention at a high degree with an advertising, didactic or entertainment purpose is obtained.

**Instructions as to the best way of bringing the invention into effect**

For the best way of bringing the invention into effect the construction of two hollow  
15 concentric cubes is proposed, with side faces of glass or multilaminar methacrylate, between the sheets of which is a liquid.

This liquid is polarizable under the action of a low-intensity current that causes its transparency effect by polarization, as the ones used in any of the notorious patents or trademarks on the market, in order to activate the transparency of translucent glass  
20 screens.

In the geometrical centre of these polyhedrons the system is provided with a projector or a bunch of image projectors which by means of a set of lenses or mirrors reflects the same image on every face of the polyhedron where it is contained.

The projector is able to project the image on the inner polyhedron if its glass faces are  
25 translucent in order to allow that the image is produced on them.

Or the image equally, in the case that the faces of the inner polyhedron are polarized and made transparent, could be projected on those of the outer polyhedron or on the following one that will have been depolarised and transformed to a translucent state with the same purpose, provided that the faces of the polyhedron placed in the middle as  
5 the case may be are in a transparent state.

In this way the same image could be seen on every face of each polyhedron, not only on the outer one but also on any of the inner ones.

Thus its projection could be alternated dynamically in each polyhedron with the effect of the modification of the three-dimensional location of the images projected on all the  
10 faces of each polyhedron, without the projector contained in the centre being visible, in order to hold intensely and in a new way spectator attention with a didactic, advertising or entertainment aim.

The association of the device to a system of sensors (either of a luminic, acoustic or thermal nature) or as the case may require to a computer, activates a programmed  
15 sequence of projections by response to a stimulus such as the mere presence of an spectator or any other stimulus that activates the sensors.

#### **Technical field**

The described invention has an industrial application as a projector with a didactic, advertising or entertainment aim.

#### **20 Drawings.-**

The figure 1 is a set of two concentric cubes . The inner projector (1) is located in the centre of the smaller polyhedron. The screen (2) that is nearer the projector permits to form the emitted image if it is in a translucent state or to pass the image through it onto the outside screen (3) if (2) is in transparent state.

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The figure 2 is a set of three conjugated cubes and it requires the use of lenses or mirrors to redirect the emitted image to the next screen.

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